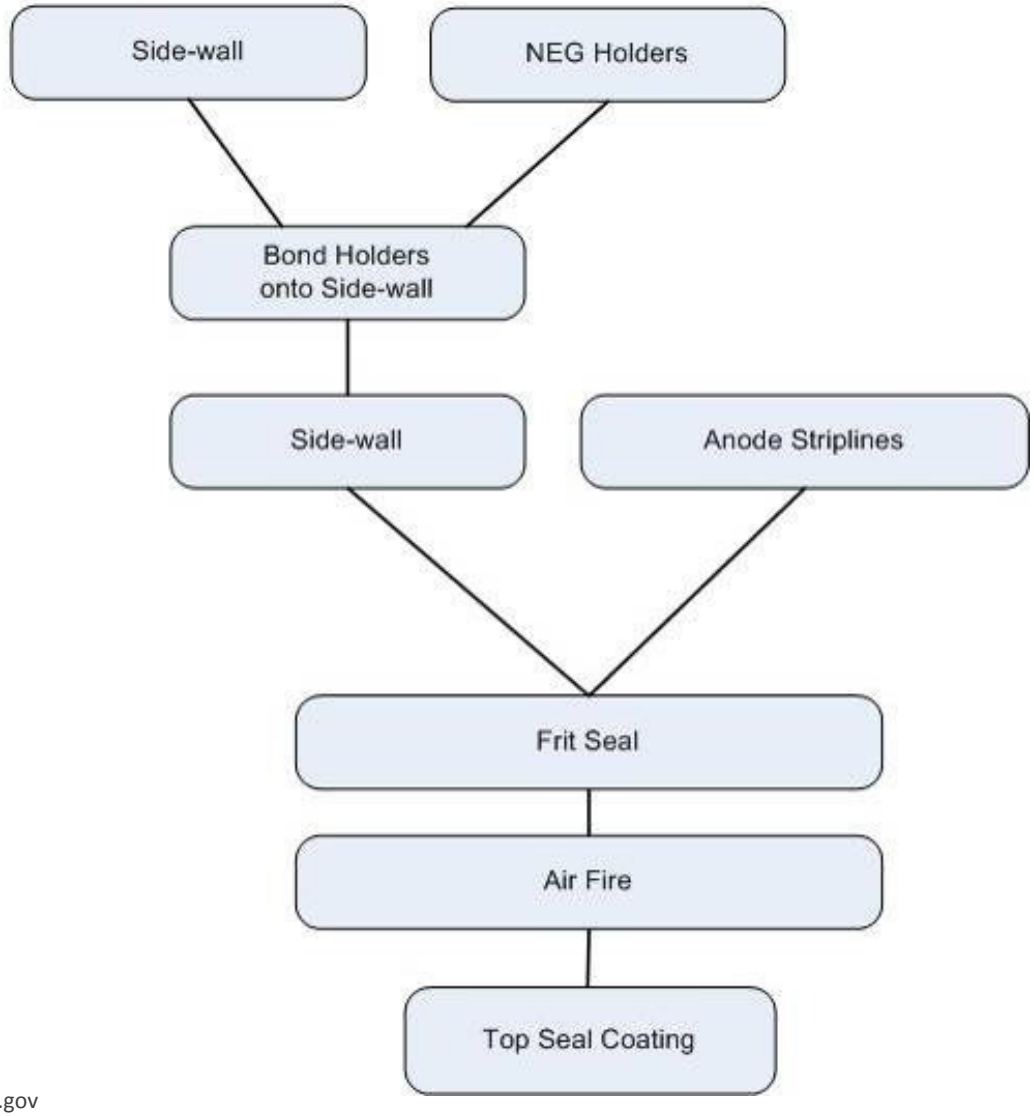
Practices for the Bonding of the Lower Body

Dean Walters

Argonne National Laboratory

Steps for making the Lower Body Assembly



Properties of frit

- Schott Boro-Float Glass frit

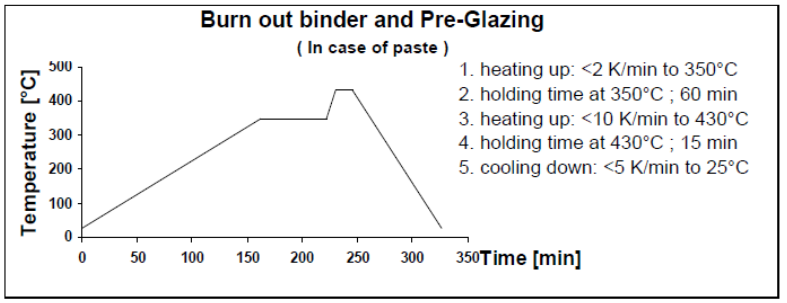
Glass No.: G018-223

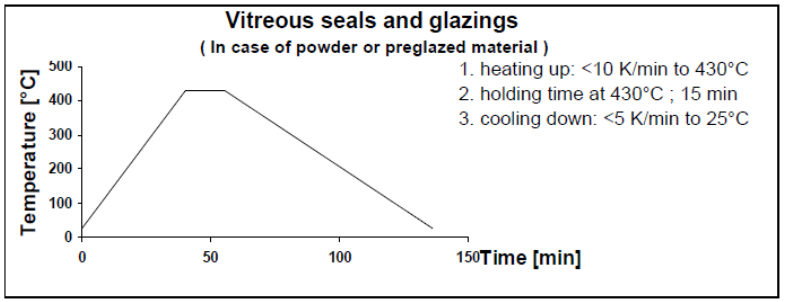
Lead containing composite solder glass for Silicon, Duran and Borofloat 3

Physical properties:
(Mean values of specified tolerance ranges)

Thermal expansion coefficient (ISO 7991)		
α_{20-250}	$3{,}14 * 10^{-6}$	K^{-1}
α_{20-300}	$3 * 10^{-6}$	K^{-1}
Transformation temperature (ISO 7884-8)	325	°C
Temperature for viscosity (ISO 7884-6) of $10^{7,6}$ dPas	359	°C
Density	6	$g*cm^{-3}$

Glass No.: G018-223



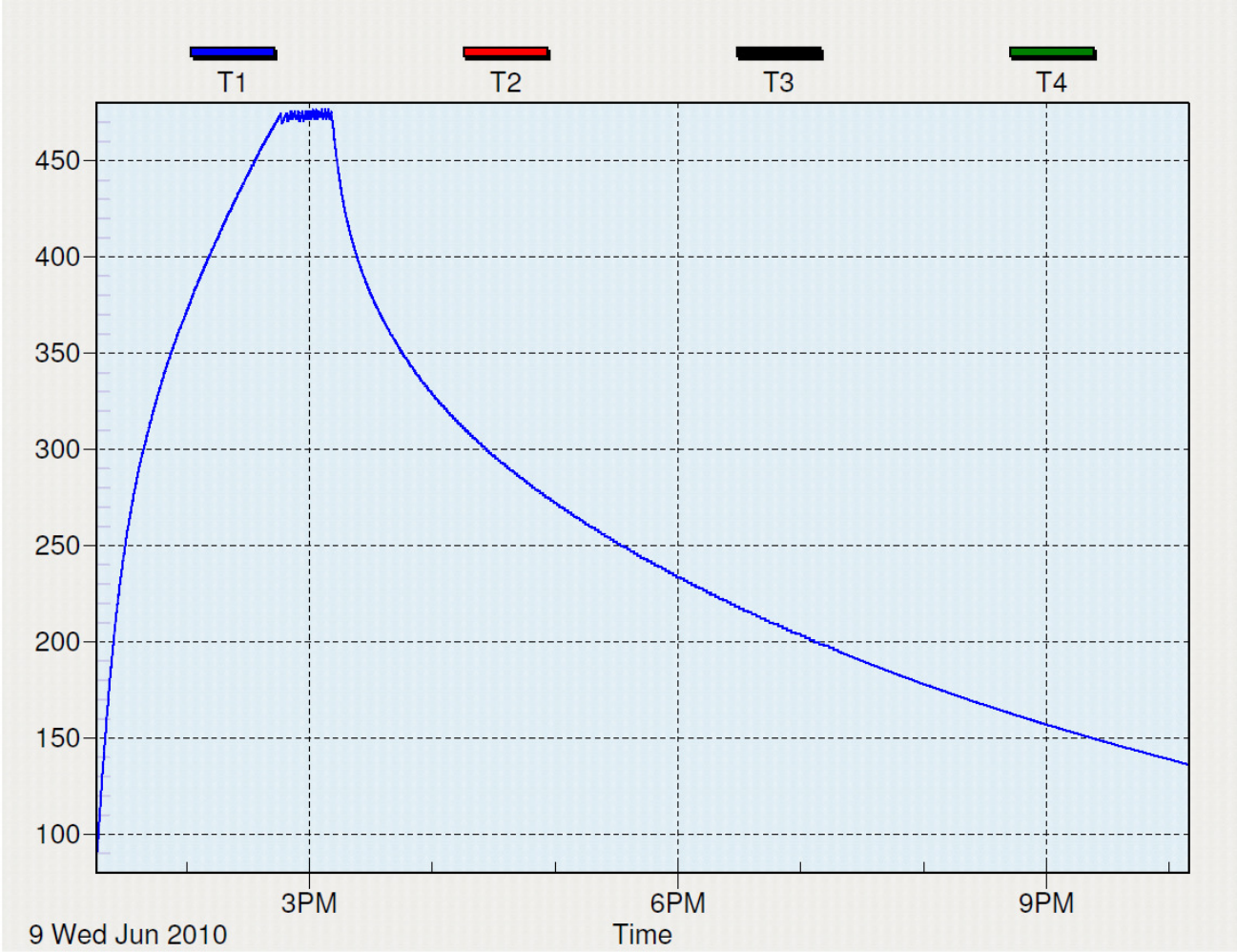


Oven for Air Firing Glass Parts

Room for two 8 inch parts that can be heated at the same time

Heating cycle

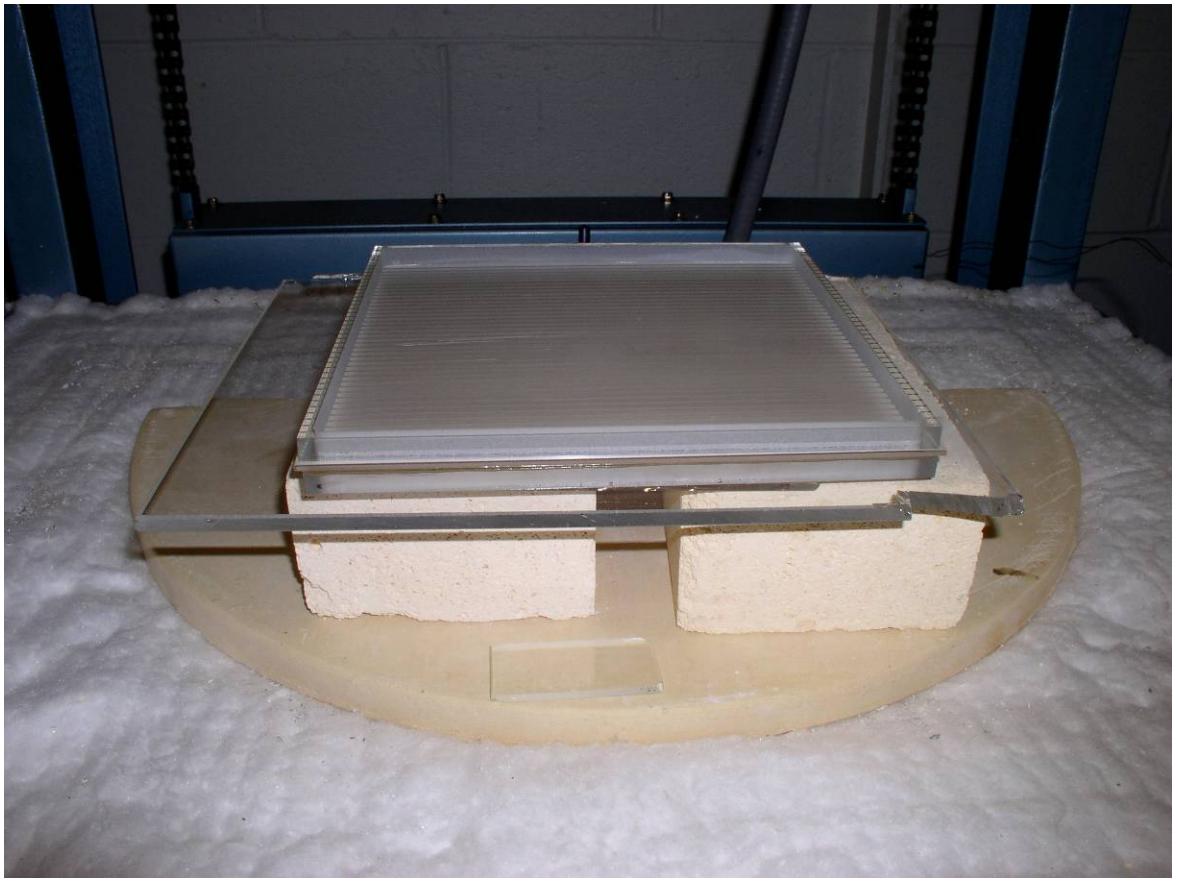
- Measured Heating Cycle



Problem of Manual Assembly

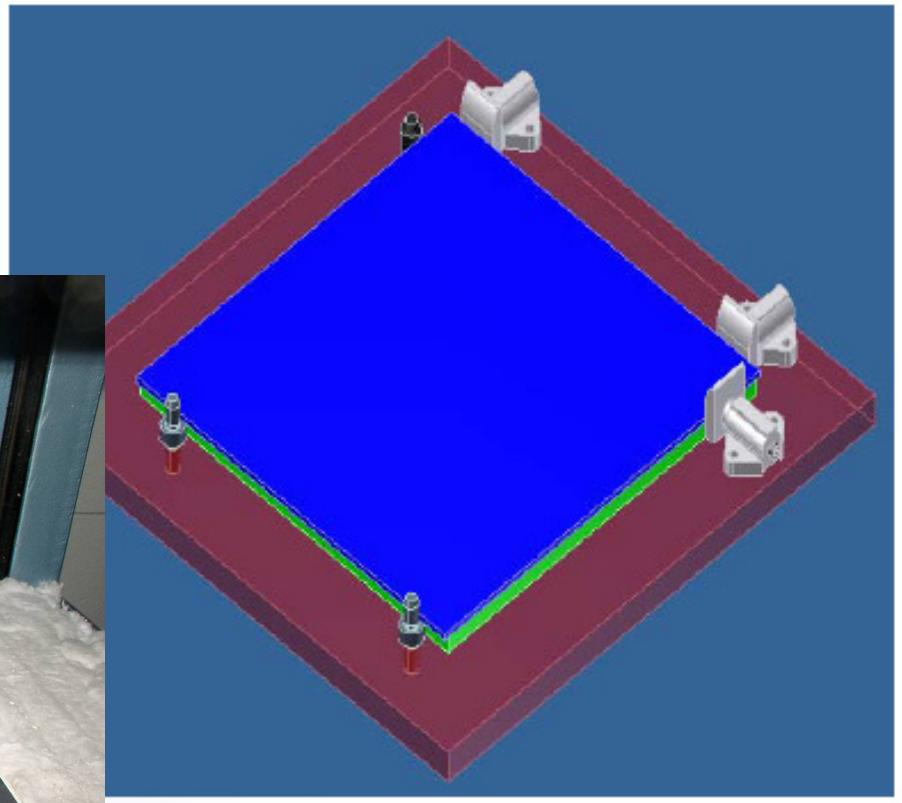
This the setup in the oven where parts are manually located.

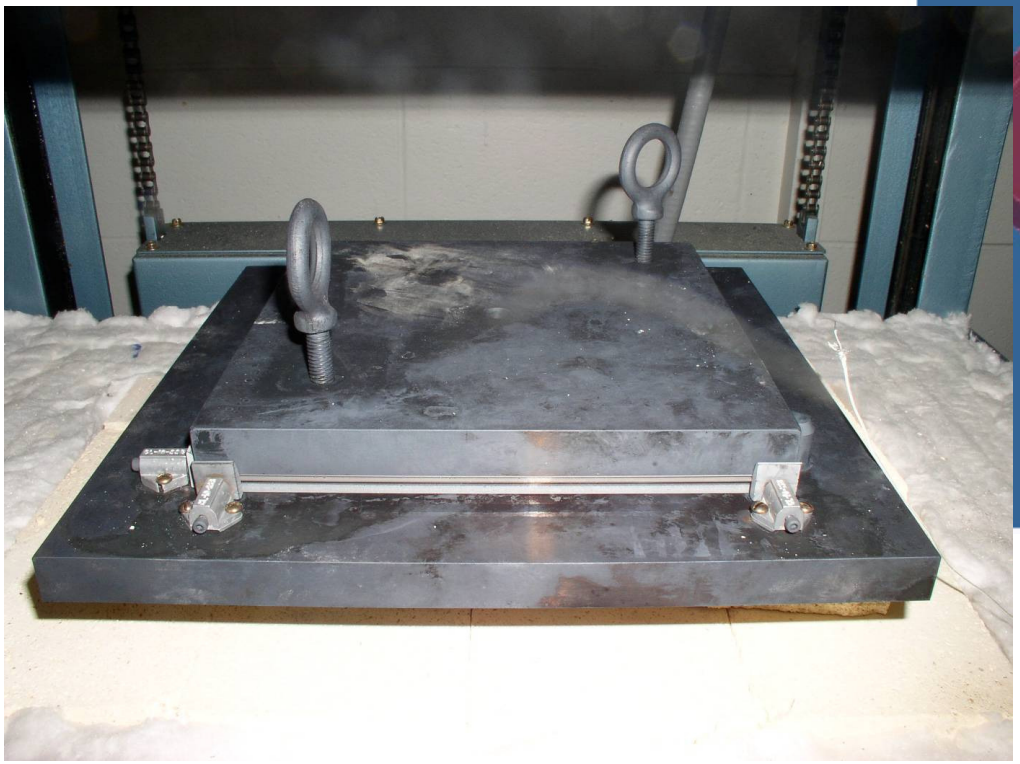
Problems have occurred during the heating cycle where the parts have moved from their initial location.



Fixture

- Fixture Design by Allen Zhao
- There have been further work by Bob Wagner and Joe Gregar

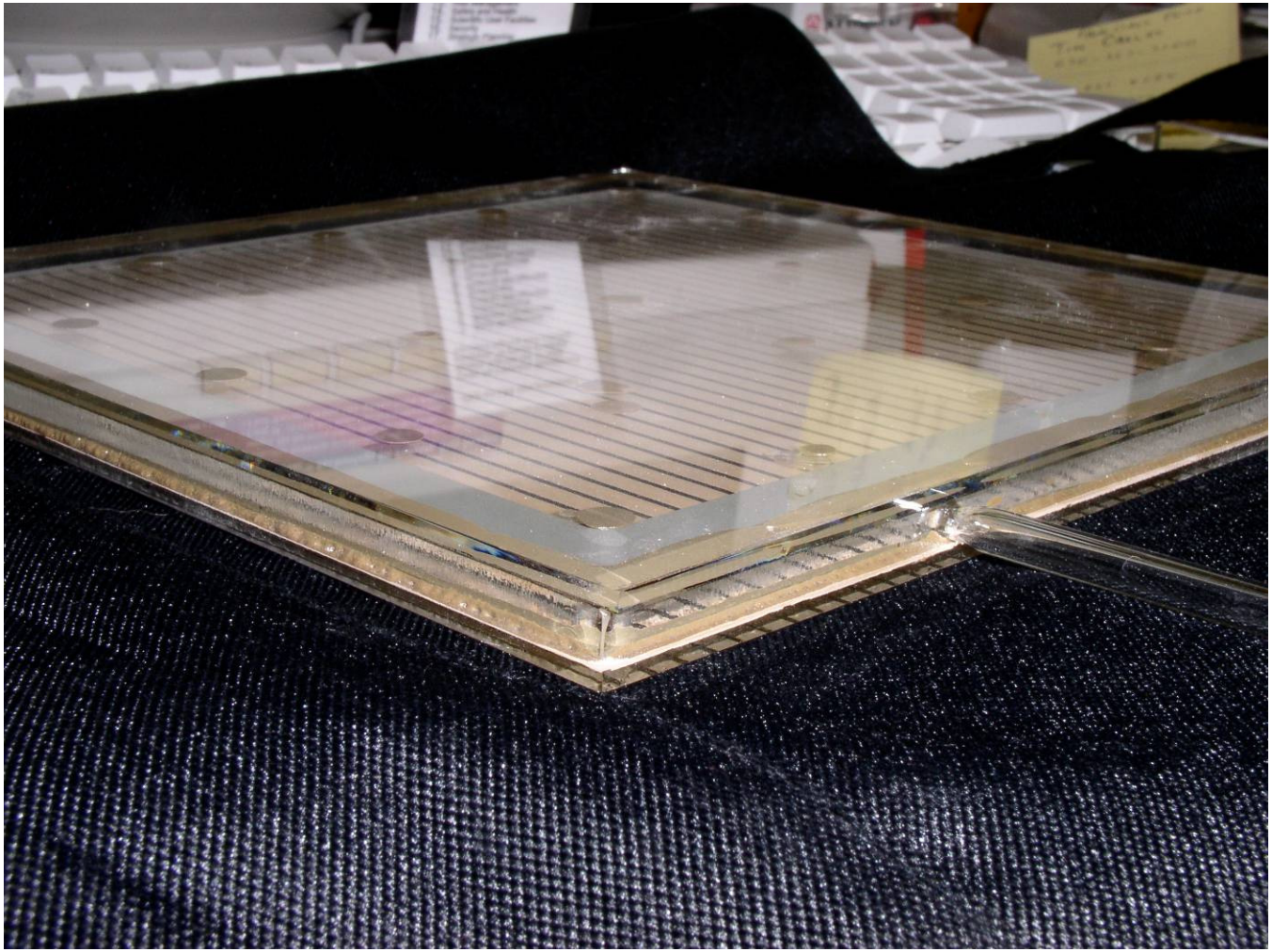




Improved fixture

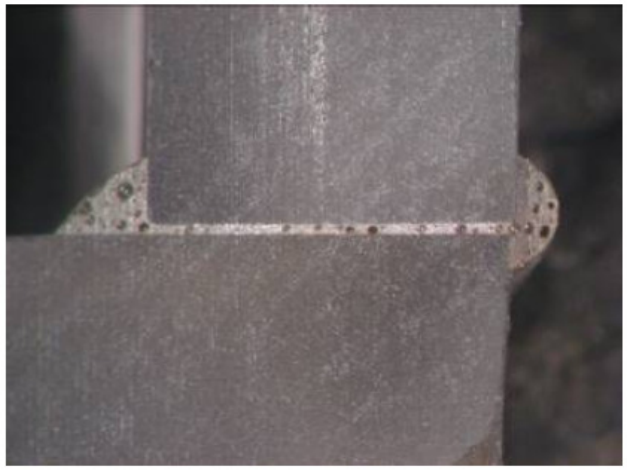
- In order to position the bottom plate without the sticking to the steel pins, glass stepped pins were used.
- The next step on this fixture is to make the base plate from Pyrex.

Latest results

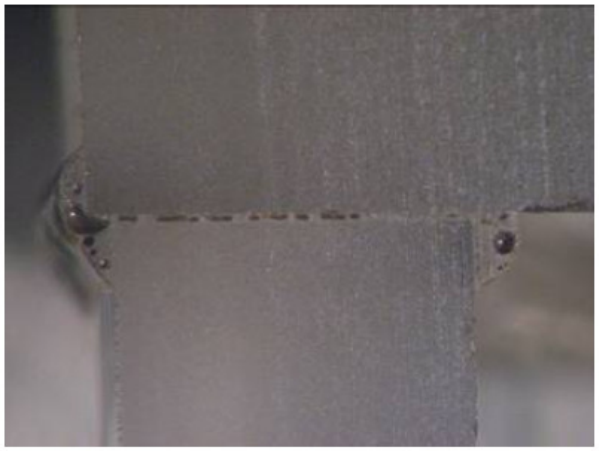


Examination of Frit Cross-Sections

Notes



Tube with vacuum leak

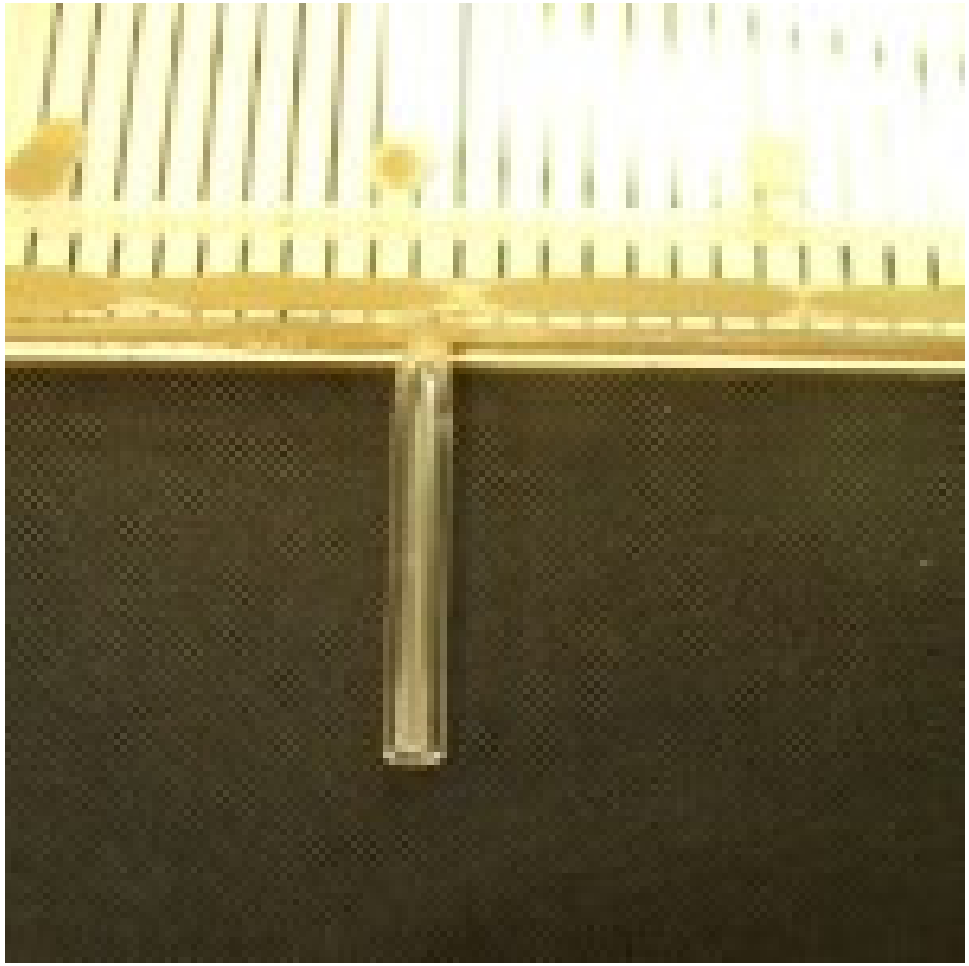


Leak tight joint

- Bubbles appear to be forming in or near the interface between the glass tube and the frit.
- The frit is applied to the glass tube where it is cured at 350 C before applying it to the anode plate.
- Examination of glass to glass fritted seals also show a formation of bubbles in the frit.
  - Parts that leak have larger and more numerous bubbles.
  - Parts that are leak tight also contain bubbles though smaller and fewer.

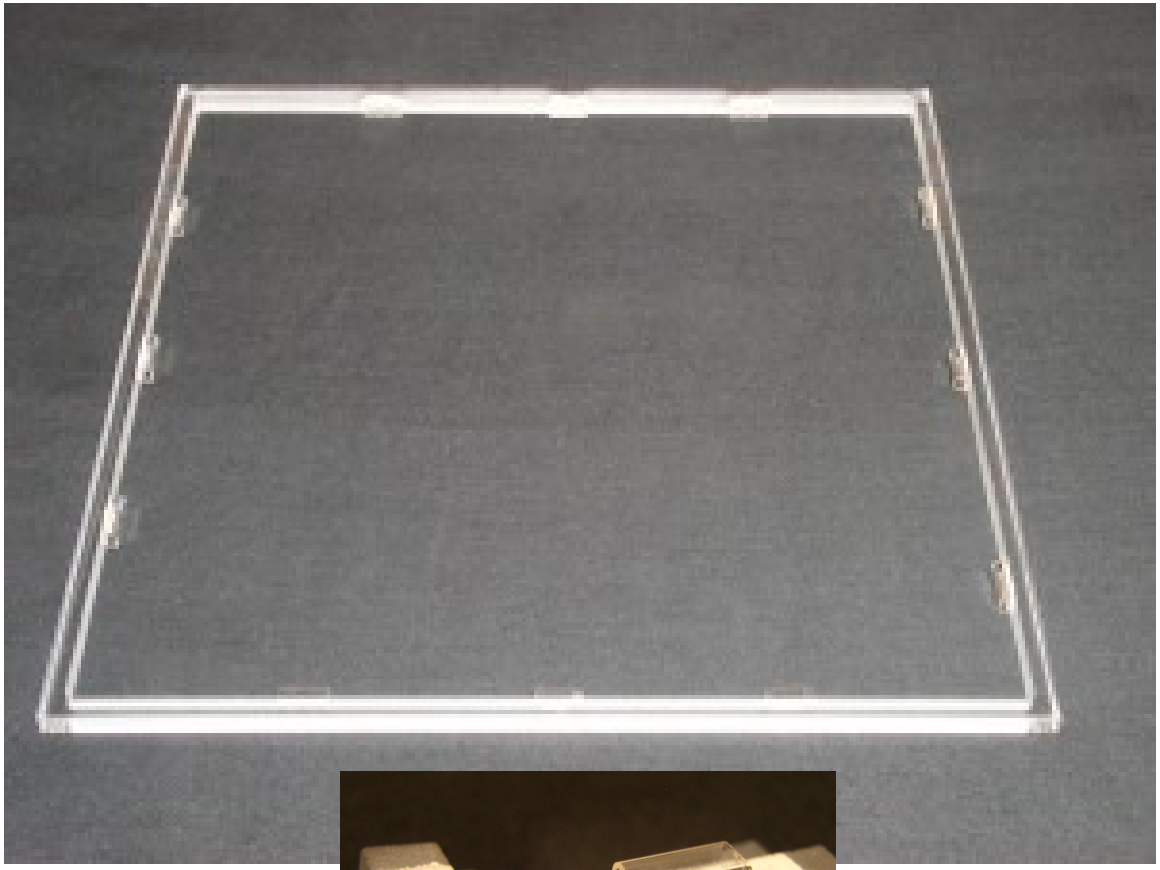
Parts with Side Tube

- In the Mock Tile Assembly there will be a Side Tube for vacuum pumping. This allows the top seal to be one of two types.

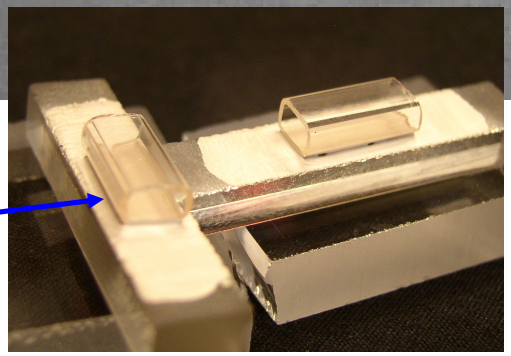


Bonding of NEG Holder to Side-wall

- In the completed version of the lower body assembly the will be a NEG pump strip located inside the body.
- To hold the strip in place and to provide positive location for the MCP assembly a series of 12 small glass rectangular tubes will be bonded to the side-wall.



This uses a silver paste rather than frit.



Fixture to Bonding the NEG Holders to the Side-Wall

- In order to place the holders in the correct location and to perform the bonding in a single oven run, this fixture will be used.